What is claimed is:

1. A rotor angle detecting apparatus for a DC brushless motor, the apparatus comprising:

a voltage applying unit for applying a drive voltage to three phase armatures of the DC brushless motor;

an inspection voltage imposing unit for imposing an inspection voltage on the drive voltage, the inspection voltage being generated by multiplying fundamental voltage string data in which a certain voltage output pattern in a predetermined period is set by a modulation coefficient whose value changes on every predetermined period;

a current detecting unit for detecting a current which flows to the armatures of the motor;

a reference value calculating unit for making reference to a detected current of the current detecting unit in a predetermined control cycle within the predetermined period when the inspection voltage is imposed on the drive voltage by the inspection voltage imposing unit and then calculating a sine reference value corresponding to a sine value of an angle which is twice a rotor angle of the motor and a cosine reference value corresponding to a cosine value of the angle which is twice the rotor angle of the motor based on a variation of the detected current detected by the current detecting

unit in each control cycle, the fundamental current string data and the modulation coefficient; and

a rotor angle detecting unit for detecting the rotor angle of the motor based on the sine reference value and the cosine reference value which are so calculated.

2. A rotor angle detecting apparatus of a DC brushless motor which handles the DC brushless motor by converting the DC brushless motor to an equivalent circuit having a q-axis armature which resides on a q-axis which constitutes a direction of magnetic flux of a field of the motor and a d-axis armature which resides on a d-axis which intersects with the q-axis at right angles, the apparatus comprising:

a dq/three phase voltage converting unit for converting a d-axis voltage which is applied to the d-axis armature and a q-axis voltage which is applied to the q-axis armature to three phase drive voltages based on a rotor angle of the motor;

a voltage applying unit for applying the drive voltages so converted to three phase armatures of the motor;

an inspection voltage imposing unit for imposing an inspection voltage on the d-axis voltage and q-axis voltage, the inspection voltage being generated by

multiplying fundamental voltage string data in which a certain voltage output pattern in a predetermined period is set by a modulation coefficient whose value changes on every predetermined period;

a current detecting unit for detecting current which flows to the three phase armatures of the motor;

a three phase/dq current converting unit for calculating a d-axis actual current which flows to the d-axis armature and a q-axis actual current which flows to the q-axis armature based on a detected current detected by the current detecting unit and the rotor angle of the motor;

a reference value calculating unit for making reference to the d-axis actual current and the q-axis actual current in a predetermined control cycle within the predetermined period when the inspection voltage is imposed on the d-axis voltage and the q-axis voltage by the inspection voltage imposing unit and then calculating a sine reference value corresponding to a sine value of an angle which is twice a phase difference ($\theta-\theta$^) between an actual value (θ) and an estimate value (θ^) of the rotor angle of the motor and a cosine reference value corresponding to a cosine value of the angle which is twice the phase difference ($\theta-\theta$^) based on variations of the d-axis actual current and the q-axis actual current

in each control cycle, the fundamental current string data and the modulation coefficient; and

a rotor angle detecting unit for detecting the rotor angle of the motor based on the sine reference value and the cosine reference value which are so calculated.

3. A rotor angle detecting apparatus of a DC brushless motor as set forth in Claim 1, wherein the fundamental voltage string data are set such that an average of output voltages in the voltage output pattern becomes 0.

4. A rotor angle detecting apparatus of a DC brushless motor as set forth in Claim 2, wherein the fundamental voltage string data are set such that an average of output voltages in the voltage output pattern becomes 0.

5. A rotor angle detecting apparatus of a DC brushless motor as set forth in Claim 1, wherein the rotor angle detecting unit calculates the sine reference value and the cosine reference value every predetermined control cycle, calculates phase difference data corresponding to a phase difference (θ-θ^) between an actual value (θ) and an estimate value (θ^) of the motor by using the sine

reference value and the cosine reference value, calculates an estimate value (θ^) of the rotor angle of the motor in a current control cycle by updating the rotor angle of the motor by an observer for sequentially updating and calculating an estimate value (θ^) of the rotor angle of the motor based on the phase difference data in such a manner as to resolve the phase difference (θ-θ^) corresponding to the phase difference data calculated in the previous control cycle by regarding the rotor angle of the motor calculated in the previous control cycle as the estimate value (θ^) of the rotor angle of the motor in the previous control cycle, and determines the estimate value (θ^) of the rotor angle so calculated as the rotor angle of the motor.

6. A rotor angle detecting apparatus of a DC brushless motor as set forth in Claim 2, wherein the rotor angle detecting unit calculates the sine reference value and the cosine reference value every predetermined control cycle, calculates phase difference data corresponding to the phase difference (θ-θ^) between the actual value (θ) and the estimate value (θ^) of the motor by using the sine reference value and the cosine reference value, calculates an estimate value (θ^) of the rotor angle of the motor in a current control cycle by updating the rotor

angle of the motor by an observer for sequentially updating and calculating an estimate value (θ^) of the rotor angle of the motor based on the phase difference data in such a manner as to resolve the phase difference (θ-θ^) corresponding to the phase difference data calculated in the previous control cycle by regarding the rotor angle of the motor calculated in the previous control cycle as the estimate value (θ^) of the rotor angle of the motor in the previous control cycle, and determines the estimate value (θ^) of the rotor angle so calculated as the rotor angle of the motor.